


The Journal of the American Association of Zoo Keepers, Inc.

AAZK

Animal Keepers' Forum



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The American Association of Zoo Keepers, Inc. exists to advance excellence in the animal keeping profession, foster effective communication beneficial to animal care, support deserving conservation projects, and promote the preservation of our natural resources and animal life.

ABOUT THE COVER

This month's cover photo comes to us from Jill Dignan of Lincoln Park Zoo and features a red panda (*Ailurus fulgens*). The red panda's name is Clark. He was the male cub born on June 26, 2015 with his sister Addison. They were the first red panda cubs ever born at Lincoln Park Zoo. To read more about the red pandas at Lincoln Park Zoo, see pages 208 - 211.

Red pandas, like giant pandas, are bamboo eaters native to Asia's high forests. Despite these similarities and their shared name, the two species are not closely related. Red pandas are much smaller than giant pandas and are the only living member of their taxonomic family. Red pandas share the giant panda's pseudo-thumb, a modified wrist bone used to grasp bamboo when feeding.

Articles sent to *Animal Keepers' Forum* will be reviewed by the editorial staff for publication. Articles of a research or technical nature will be submitted to one or more of the zoo professionals who serve as referees for AKF. No commitment is made to the author, but an effort will be made to publish articles as soon as possible. Lengthy articles may be separated into monthly installments at the discretion of the Editor. The Editor reserves the right to edit material without consultation unless approval is requested in writing by the author. Materials submitted will not be returned unless accompanied by a stamped, self-addressed, appropriately-sized envelope. Telephone, fax or e-mail contributions of late-breaking news or last-minute insertions are accepted as space allows. Phone (330) 483-1104; FAX (330) 483-1444; e-mail is shane.good@aazk.org. If you have questions about submission guidelines, please contact the Editor. Submission guidelines are also found at: aazk.org/akf-submission-guidelines/.

Deadline for each regular issue is the 3rd of the preceding month. Dedicated issues may have separate deadline dates and will be noted by the Editor.

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***AAZK is better
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As you read this issue of the *Animal Keeper's Forum*, the next great AAZK event will be approaching the starting line: the 45th annual AAZK National Conference in Indianapolis, Indiana. Our host, the Indianapolis AAZK Chapter, will show us how to “Drive Animal Conservation” as we delve into an extraordinary program that includes topics on advanced elephant husbandry, advanced marine mammal husbandry, and keeper safety, just to name a few. The featured keynote speaker is 2018 Indianapolis Prize nominee, Dr. Ian Singleton, who will waive the starting flag for an exciting week of professional networking, learning and conservation awareness.

Serendipity is the occurrence and development of events by chance in a beneficial way. I originally joined the Board as an interim member in January of 2015, at the invitation of then current President, Bob Cisneros. I was asked to step in as the oversight for the Communication Committee and so began my journey with AAZK in a leadership role.

When I was voted in by the membership to join the AAZK Board of Directors at the National Conference in 2015, I became part of a team that would make an impact on the future of the Association. I have served many roles while part of this team; as Board Oversight for Professional Development, International Outreach, Communication, AAZK Resources, and National Zoo Keeper Week, as well as AAZK Conference Manager. My most rewarding role began when I was sworn in as President, during the Association's 50th anniversary year, in our nation's capital, in 2017.

The most challenging part of being President for me was writing my message for the *Animal Keeper's Forum* each month. Now, as my term on the Board comes to an end, I feel as though I've found my voice. I've grown personally and professionally during these past four years. I've made a network of friends and colleagues that I will take with me into the future. From the bottom of my heart, I thank you for this opportunity.

I hope each of you will continue to share your passion by recruiting new members to the profession, to AAZK and to your Chapters. Continue to network with your peers and seek professional development opportunities to become the very best that you can be in your field. Be champions for conservation through AAZK programs locally and globally. And challenge yourselves to have excellent communication with one another. I believe that communication is interwoven into everything we do as animal care professionals and is the most important tool we have to keep us engaged with our profession, our animals and our communities.

AAZK is better—and stronger—because of you. Be precise. Be relevant. Be accessible. Be credible.

I'm looking forward to seeing you in Indianapolis, or wherever our paths cross again in the future.

Cheers,

Bethany
Bethany.bingham@aazk.org

COMING EVENTS

Post upcoming events here!
e-mail shane.good@aazk.org

September 7-11, 2019
AZA and IMATA Annual Conference
New Orleans, LA
Hosted by Audubon Zoo and Audubon Aquarium of the Americas
For more information go to: aza.org

September 22-27, 2019
ASSOCIATION OF ZOO VETERINARY TECHNICIANS Annual Conference
Colorado Springs, CO
Hosted by Cheyenne Mountain Zoo
For more information go to: <https://www.azvt.org/page-7741>

September 27-28, 2019
International Advancing Herpetological Husbandry Conference
Rodeo, NM
For more information go to: ahhconferences.com/

September 30 - Oct. 4, 2019
New World Primate TAG Husbandry Workshop
New Bedford, MA
Hosted by Buttonwood Park Zoo
For more information go to: <https://www.bpzoo.org/nwptag-conference-registration/>

October 7-11, 2019
Giraffe Care Workshop
Colorado Springs, CO
Hosted by Cheyenne Mountain Zoo
For more information go to: <http://www.cmzoo.org/index.php/giraffe-care-workshop/>

October 7-11, 2019
"From Good Care to Great Welfare" workshop
Detroit, MI
Hosted by Detroit Zoological Society's Center for Zoo and Aquarium Animal Welfare and Ethics. For more information go to: <http://www.czaw.org/events>

October 17-18, 2019
Animal Training Workshop
Kansas City, MO
Hosted by Kansas City Zoo
For more information go to: <http://kansascityzoo.doubleknot.com/event/kansas-city-zoo-animal-training-workshop/2502109>

November 4-7, 2019
Polar Bear Workshop
Toronto, Ontario, Canada
Hosted by Toronto Zoo
For more information go to: education.torontozoo.com/products/1099943-polar-bear-workshop-2019.aspx

April 4-9, 2020
AZA Mid-Year Meeting
Palm Springs, CA
Hosted by The Living Desert Zoo and Gardens.
For more information go to: aza.org/conferences-meetings



August 18-22, 2019
AAZK National Conference
Indianapolis, IN

Hosted by Indy AAZK and the Indianapolis Zoo

www.indyaazk.org

September 13-17, 2020
AZA Annual Conference
Columbus, OH
Hosted by the Columbus Zoo and Aquarium
For more information go to: aza.org/conferences-meetings



Red Panda Management: Evolving Set-ups During Different Breeding and Housing Recommendations

*Jill Dignan, Assistant Lead Keeper
Lincoln Park Zoo
Chicago, IL*

At Lincoln Park Zoo we have had several different breeding pairs of red pandas (*Ailurus fulgens*) but it wasn't until 2015 that we had our first confirmed pregnancy. Keepers had observed breeding on multiple different occasions in February 2015 from the pair and we were able to verify that our female was pregnant with at least two cubs via transabdominal ultrasound imaged during voluntary training with a veterinarian (Figure 1). Being that this was the first pregnancy of a red panda at our facility, we went with a conservative approach in the management style for her impending birth.

Leafa, our 5-year-old female, had previous successful litters at other Association of Zoos and Aquariums (AZA)-accredited institutions. Although she was experienced, this was a first for the zoo and we decided that it would be best if we secured her inside our holding area, separate from our male, Phoenix. Our holding area is completely indoors and not visible to the public (Figure 2). It is temperature controlled at a range of 65-75 degrees, has several different nest boxes to choose from and above all, Leafa was very comfortable in the area. Both pandas are housed together year-round; however neither tends to seek one another out for companionship, so separating the two for approximately four months didn't pose as a stressful situation to either panda.

Cameras were installed in both nest boxes and two months prior to the estimated due date, staff monitored Leafa via weekly weights and ultrasound imaging with veterinarians. Pre and post-natal plans were written up and about two weeks prior to impending birth, Leafa and Phoenix were separated and Leafa was kept off-exhibit. On June 27, 2015, Lincoln Park Zoo's first ever red panda cubs were born. Both healthy, the male and female cub thrived in the nest box and Leafa showcased her natural maternal instincts. Per standard red panda cubbing history, both cubs remained in the nest box for several months following birth. Just past two months old, Clark (male) and Addison (female) started to venture out into their den area and it was time to talk about giving them access to the outside habitat. Although our den area is set up great for inside housing,

Being that this was the first pregnancy of a red panda at our facility, we went with a conservative approach in the management style for her impending birth.



Figure 1. Ultrasound image of red panda cubs.



Figure 2. Indoor denning area.



Figure 3. Transfer hallway training.

it is not ideal for housing two separate groups of pandas. In order to let Leafa and the cubs go outside, we would need to secure Phoenix in holding. Phoenix historically is a reliable shifter and for the most part is comfortable being in the indoor space. However, once all pandas are in, there is no way to get the group shifted outside without introducing them. Keeper staff came up with a solution and we made a transfer hallway using baffle boards. Keepers set up multiple boards that made a runway from one holding den to the other via the keeper vestibule (Figure 3). Leafa and the cubs were secured in the overhead chute that connected the two dens, and within two training sessions, Phoenix was trained to follow the keepers in a free contact setting from one den to the other.

This set-up worked well and keepers were able to put the pandas on a rotation that allowed each group to get time in the outdoor habitat. Within one week of utilizing the boards with Phoenix, Leafa and the cubs were also trained to follow in the keeper runway, which allowed for keeper flexibility. Although this set-up did work, it was taxing on keeper staff in regards to set-up and time. It also became an issue when one group of pandas didn't shift back inside, which then didn't allow the other group to go outside. Once the cubs were acclimated to the outdoor habitat and shifting reliably, an introduction plan was written up in hopes that we could house all four pandas together to allow everyone to have the choice of where they wanted to spend their time. In general, Phoenix was a male with a calm demeanor and we did not have any reservations moving forward.

Keepers began the process slowly and introductions with just Leafa and Phoenix started at the end of September and continued for two weeks without incident. Introductions commenced with the group in mid-October when the cubs were now just shy of four months old. Although Leafa didn't let Phoenix get very close, he was respectful of their space and did his own thing. The cubs were curious, but not intrusive and all introductions were going well.

Five days after supervised introductions had started, Clark slipped from a



Figure 4. Den connected to the outdoor habitat.

platform and landed directly in front of Phoenix. Phoenix paused for a moment but then jumped onto Clark and was on top of him and appeared to be biting him with no signs of letting up. Clark was vocalizing and resisting and keepers were about to intervene when Leafa jumped down and ran Phoenix away. There were no injuries sustained, but keepers were uncomfortable with the situation and it was decided not to move forward with the original introduction plans. For the next three months, we housed the groups separate and shifted them via the keeper runway two times a day. In January, we switched the groups up, as we received another breeding recommendation from the SSP. The cubs were separated from Leafa and housed together and both parents were reintroduced with no issues. This set up was maintained until late winter/early spring when both cubs were transferred to other AZA institutions.

Once again, breeding had been observed and another pregnancy for Leafa was confirmed via transabdominal ultrasound imaged during voluntary training with a veterinarian. Due to the time constraints that the previous year's set-up had caused, keeper staff wanted to try something new for Leafa's upcoming birth. We reached out to several other institutions and came up with a plan and presented it to management. It was agreed upon that moving forward, in hopes that both Leafa and Phoenix would be more comfortable, we would not separate

pandas and they would be housed together during pre and postnatal care. This would allow for Leafa to have more choices and options as to where she wanted to spend her time and give birth. It would also give Phoenix the opportunity to be around the cubs at a younger age, which would hopefully allow him to gain some confidence and not be nervous around them.

Leafa gave birth on June 23, 2016 inside, but not in the den we had chosen for her the previous year. This den was the one connected to the outdoor habitat, which required Phoenix to shift through in order to come directly inside (Figure 4). The first two weeks after birth, keeper staff did not see him inside. Typically, all food is offered in the holding areas, but staff adjusted protocol due to the new situation and provided food outside. After the initial few weeks, Phoenix started to shift inside again but kept his distance from the nest box. If he got too close, Leafa would chase him away, but these interactions decreased daily. Within one month, it appeared that both adults were comfortable with the current set-up and both were shifting reliably. Leafa was even choosing to spend some time outside and away from the cubs. Once the cubs, Sheffield (male) and Waveland (female) started to venture out of the box, it was clear that the new set-up was a success. The interactions between the cubs and Phoenix were enjoyable for keepers to observe, as they were often seen playing and sleeping together (Figure 5).

After we received Species Survival Plan (SSP) recommendations for the upcoming breeding season, we were told that not only did we not have a breeding recommendation but we also had a hold on the cubs and they would be staying at Lincoln Park Zoo for the following year. This again put us in a new situation and staff discussed our options. We knew that the adults needed to be separated seasonally for birth control methods but there were still concerns about separating Phoenix from the cubs for three months and then re-introducing based on previous experience. We did not want to put ourselves in the situation where we had to house two different groups for an indefinite amount of time. We reached out again to some other facilities and found out that most issues tended to happen when males were reintroduced with other males. With that information we decided that we were going to separate the females and males. There was a lot of back and forth between staff about what was best for the group long-term, as we knew separating the cubs from one another was going to be tough in the beginning. It was decided that the short-term stress of the situation would be worth the end result of being able to reintroduce all four pandas together after breeding season was over.

The first few days following the separation were challenging, mostly for Sheffield. He vocalized often and was seen climbing the mesh, which was not typical behavior for him. However,

Figure 6. Lincoln Park Zoo's red panda staff.





Figure 5. Red panda family photo.

within 1-2 days, all pandas seemed to settle down and were back to eating and shifting normally. Both Leafa and Waveland were playing and sleeping together as were Phoenix and Sheffield. The groups were housed like this for the breeding season (3+ months) and then were successfully reintroduced with no issues. They continued to live in this arrangement for the following year, until both cubs were transferred together to another zoo.

Being given different situations for the same breeding pair truly made the

staff evaluate each set up individually. This allowed us to assess each specific animal, their individual welfare, what was best for them and what also worked well for the group. Being flexible, willing to try new things and reaching out to others for information was a huge part of our success. It should also be noted that once again, we did not have a breeding recommendation and had to separate Leafa and Phoenix for the 2018 breeding season. Keepers came up with a time solution in regards to shifting across the keeper area and have now implemented it using a baby

gate, instead of the board system, which cuts down on keeper time and only one keeper is needed. This was a team effort and couldn't have been done without creativity, compromise and dedication. Shout out to Anthony Neilsen, Allycia Darst, Christopher Donahoe, Samantha Emberton, Laszlo Szilagyi, Mark Kahmhout and Dave Bernier for working together and making our set up a success for both animals and keepers alike (Figure 6). 🐼

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Annual Report 2018

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AAZK traditionally recognizes its Chapter partners during the AAZK National Conference during the Awards Ceremony with a PowerPoint backdrop (loop) presentation of Awards. Below is a list of the Chapter partner Fee/Duty Obligations by recognition category followed by both AKF and Committee support, either undefined or directed by the Chapter Partner, where the support is defined.

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Dear Friends,

AAZK is once again pleased to offer our member partners a transparent view into AAZK through our 2018 Annual Report. AAZK continues to be at the forefront of animal welfare and continuing education for animal care professionals

The *Animal Keepers' Forum* has been continually published in varying forms since 1968. Editor Shane Good reports on the AKF, highlighted by an issue dedicated to Population Management sponsored by the AZA Population Management Centers, Riverbanks Zoological Garden and San Diego Zoo Global. 2018 marked the first year of the presidential term of Bethany Bingham. Bethany reports on the goals of AAZK and continuing education moving forward through Strategic Planning and AAZK Conferences.

AAZK awards approximately \$40,000 in member grants annually. A number of those grants concentrate on conservation. Mary Ann Cisneros, Vice President and Board Member Oversight for Conservation reports on the AAZK fund-raising efforts in 2018 for our two signature conservation programs.

Ed Hansen

AAZK CEO/CFO

Questions regarding the AAZK Annual Report may be directed to Ed.Hansen@aazk.org.

President's Message

In 2018, the Board of Directors began the process of creating strategic plans for each of the AAZK Committees and Programs. This process is an in-depth focus on the strengths, weaknesses and objectives for each committee and program, and development of a three to five year timeline for goal completion. The strategic plans will be completed for all 12 of the Committees and Programs. The annual AAZK National Conference offers delegates the opportunity to travel to a variety of different destinations to meet and network with other animal care professionals from across the country. An AAZK Conference also provides a unique destination learning experience through a selection of Professional Certificate Courses offering 12 hours of student-instructor contact time in the selected subject matter. Registrants complete a post-course testing process that results in the awarding of a Professional Certificate of completion.

Bethany Bingham

AAZK President

Conservation

In 2018, National AAZK's Conservation Committee continues to manage AAZK's signature conservation programs; Bowling for Rhinos (BFR) and Trees for You and Me (TFYM). The 2018 BFR saw 86 events and numerous donations in North America and beyond which raised \$580,900.22. Funds were distributed to our international conservation partners, International Rhino Foundation, Lewa Wildlife Conservancy, and Action for Cheetahs in Kenya. A portion (2%) of the funds is set aside for the Bowling for Rhinos Conservation Resource Grant. In 2018 the BFR-CRG was awarded to the Peregrine Fund for "Stop Poisoning Now: tackling wildlife poisoning in Kenya".

Total Distribution \$581,905.22



TFYM surpassed \$20,000 for the first time in 2018. Grant funds were distributed to the Red Panda Network's Asian Division and Save the Golden Lion Tamarin. The grant recipients further AAZK and Polar Bears International's quest to fight climate change through reforestation and habitat revitalization.

The BFR and TFYM grants protect and preserve animals in the wild and the habitat in which they reside.

Mary Ann Cisneros

AAZK Vice-President

Animal Keepers' Forum

The *Animal Keepers' Forum* continues to be the main communication tool for members, sponsors and advertisers. The monthly journal shares quality articles submitted by our members and supporters through features such as Training Tales, Enrichment Options and Conservation Station. This year we were excited to offer our members a special issue dedicated to Waterfowl, and recently an entire issue focused on Aquatics. The AKF highlights best practices and innovations in animal care, conservation success stories, plus training and enrichment ideas. Animal care professionals share and learn from experiences shared by their colleagues, and we are always interested in hearing from you. If you have comments for the Editor or would like to submit an article or cover photo— please e-mail Shane.Good@aazk.org.

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BFR Product Sales	\$ 51.00
BFR Trip Winner Payout	\$ 4,200.00
BFR Registration Fee Donation	\$ 3,981.84
Board Travel/Lodging	\$ 7,936.33
CEO Expenses/Travel/Lodging	\$ 2,017.94
Committee	\$ 4,781.72
Conference	\$ 15,201.65
Board-ratified Donation Out	\$ 16,325.55
Grants	\$ 35,918.81
Office	\$ 3,552.42
Office Rent	\$ 13,166.40
Payroll Fee	\$ 2,388.93
Payroll Taxes	\$ 22,841.24
Pension Contribution	\$ 3,975.12
Pension Management Fee	\$ 1,273.00
Postage and Delivery	\$ 2,696.56
Print and Production	\$ 1,712.65
Product Expense	\$ 5,138.19
Program Expense	\$ 1,500.00
Salaries and Wages	\$ 61,356.36
AKF Postage and Delivery	\$ 17,504.14
AKF Printing	\$ 54,726.00
Insurance	\$ 1,133.00
Professional and Legal Fees	\$ 3,050.00
Taxes (business)	\$ 73.00
Utilities	\$ 913.39
Web Revision and Management	\$ 1,358.38
Zoo Keeping Textbook Purchase and Distribution	\$ 1,131.12
Total Expenses	\$ 276,185.99

INCOME 2018

BFR Registration Fee	\$ 3,905.08
BFR Dedicated Program Income	
BFR CRG	\$ 11,159.36
BFR Trip Retention	\$ 6,750.00
Conference Income	\$ 23,507.38
Donation	\$ 37,318.00
Non-member Job Posting	\$ 3,198.10
Membership	\$ 133,642.30
Product Sales	\$ 10,241.87
Re-charter Fee & Duty Obligation	\$ 63,624.76
Advertising	\$ 29,139.10
Tax/Utility Refunds	\$ 201.59
Total Income	\$ 304,777.58

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Acclimating the Red Pandas to their New Exhibit

*Patricia Jarvis, Asia Trail Intern
Smithsonian National Zoological Park
Washington, D.C.*



Introduction

Recognized by their thick red fur, red pandas (*Ailurus fulgens*) are the only living member of the family Ailuridae and are known to be elusive in the wild. Red pandas live in mountainous areas in primarily broad-leaf deciduous and subalpine forests (Pradhan et al., 2001). Red pandas are native to central China and can also be found in bordering countries such as Myanmar, Nepal, and India.

In the spring of 2016, the National Zoo introduced two new red pandas, Tusa and Asa (1.1), to a new exhibit, which included an outdoor yard and a building. The building had limited viewing that allowed visitors to see only one of the four indoor enclosures. Keepers found that the red pandas were spending most of their time indoors, inhibiting the public's ability to adequately view the animals.

To encourage the red pandas to spend more time outdoors, the Asia Trail team sought to accomplish two objectives:

- (1) Examine possible environmental factors that led to the red pandas spending most of their time indoors; and
- (2) Experiment with various management changes to encourage the red pandas to utilize their outdoor yard.

Findings observed from this study were presented to the zoo keepers and curator of Asia Trail as well as at the 44th Annual National AAZK Conference.

Methods

Over a four-week period, this study examined management changes (food placement, enrichment presentation, etc.)

Over a four-week period, this study examined management changes (food placement, enrichment presentation, etc.) and environmental factors (temperature, decibel level, and crowd size) as they related to the percentage of time that each red panda spent outdoors.



Above: Asa and Tusa on exhibit. Opposite page: Tusa eating bamboo in the yard.

THIS WEEK



The weekly management change schedule was as follows:

Week 1 No management change occurred. This means that the red pandas continued to receive all of their diet, bamboo, and biscuits inside. Baseline data were collected this week.

Week 2 The location of red panda biscuits was moved from the indoor enclosure to the outdoor yard, but all bamboo remained inside.

Week 3 All biscuits continued to be fed outside, and half of the bamboo was placed outdoors. Later in the week, keepers added enrichment to the yard.

Week 4 All biscuits and bamboo were placed outdoors, the temperature of the indoor building was increased from 70 degrees to 75 degrees, and enrichment was continued.

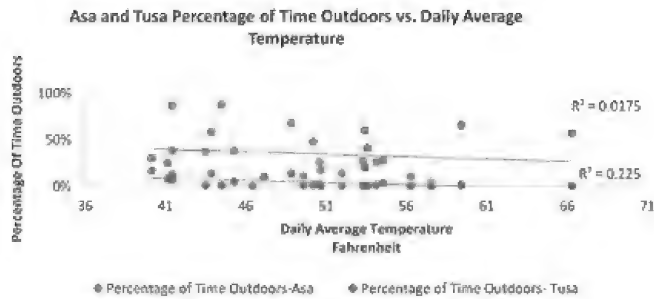


Figure 1 illustrates the regression analysis for Asa and Tusa's percentage of time outdoors vs. the daily average temperature. The R^2 values are very low for both red pandas indicating that there was no statistical significance, although a slight negative trendline can be seen.

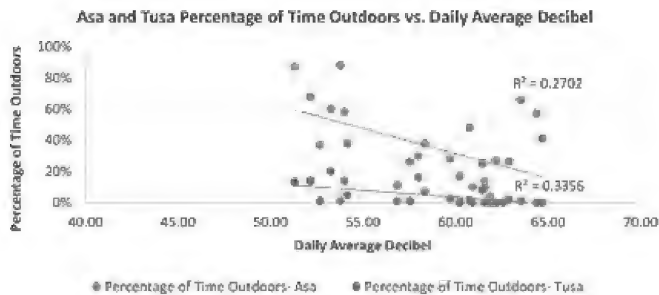


Figure 2 illustrates the percentage of time outdoors vs. the daily average decibel (noise level). Although the trendlines appear to indicate some potential significance, the R^2 values are low and do not indicate statistical significance. It should be noted that percentage of time outdoors vs. daily average decibel gave the highest R^2 values of all the environmental factors measured. Asa had an R^2 of 27% and Tusa had an R^2 of 33%. Since our R^2 should be close to 1.0, these percentages, although the highest in the study, are actually very low.

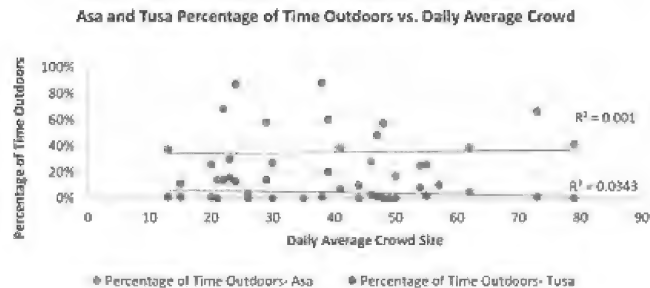


Figure 3 illustrates the relationship between percentage of time outdoors vs. daily average crowd size. From the graph you can see that the trendline is almost a straight line. As one would expect, the R^2 values are very low, with the highest at 3% from Tusa. This is the lowest R^2 value analyzed from the data collected. Crowd size did not appear to be statistically significant in this study.

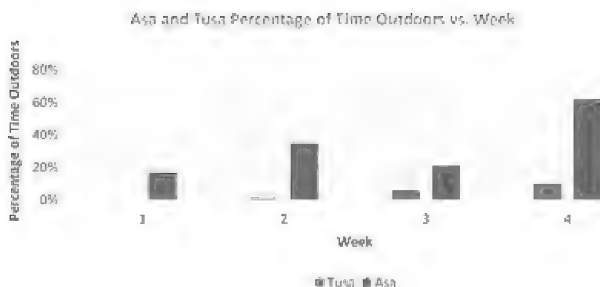


Figure 4 is a bar graph illustrating the observed percentage of time spent outdoors each week. Week one only shows Asa, the female, because Tusa, the male, was not observed outside. Week two shows an increased frequency of outdoor time from both Asa and Tusa. During week three, Asa's time outdoors decreased a little, while Tusa's continued to steadily increase. By week 4, Asa was observed outside more often than inside for the first time, and Tusa had his largest increase of observed time spent outdoors since the study began.



Asa munching on dwarf bamboo

and environmental factors (temperature, decibel level, and crowd size) as they related to the percentage of time that each red panda spent outdoors. Each red panda's location as well as the daily average temperature, daily average decibels, and daily average crowd size were recorded from 7am-3pm. Data were collected during each hour for 15 minutes on each one minute mark. Temperature was recorded at the beginning and end of each 15 minute interval. Observations took place from October 2016 to the beginning of December 2016 in seven day increments. It should be noted that the recorded percentage of time outdoors is an observed percentage and does not account for the full amount of time each red panda spent outdoors. The chutes that allowed for access onto the yard from the enclosure were left open at all times for the red pandas to have the choice of where to spend time in their day.

Data

After plotting each environmental factor against the observed percentage of time each red panda spent outside, a regression analysis was conducted to determine whether each factor played a statistically significant role in the red pandas' decision to spend time outdoors. The R^2 value illustrates the probability of a correlation between the X axis and Y axis. Data that are significant will be close to 1.0.


Results

The data for both the daily average temperature and the daily average decibel (noise level) show a slight negative trendline, suggesting higher temperatures and more noise in the park caused the red pandas to spend more time inside. However, the regression analysis shows that these environmental factors did not statistically affect where they spent their time. The trendline for the daily average crowd size suggests that it has no effect on where the red pandas spent their time, and the regression analysis confirms that this factor was indeed not statistically significant. No environmental factors that were measured in this study had any statistical correlation to where the red pandas spent their time. While not statistically associated with the measured environmental factors, there was still a desired increase in the amount of time the red pandas spent in their outside exhibit over the course of the study. During that time frame, management changes were implemented to experiment with the location of food, the addition of simple enrichment, and the adjustment of indoor building temperature. In week 1, figure 4 shows Asa, the female, observed outside 17% of the time, while Tusa, the male, was not seen at all. By week 4, Asa is observed outside more than inside, with an increase of 246% when compared to week 1. Tusa's observed time outside increased by 10% from week one.

Conclusion

Since none of the measured environmental factors illustrated any statistical significance, it would appear that some other factor played a role in the red pandas' decision to spend time outdoors. It is my conclusion that the management changes our team put in place likely had the largest impact on the red pandas' observed time spent outdoors. When the food was placed outdoors, the frequency of seeing the red pandas outside increased. Whether or not this was the only factor cannot be determined by this study. It is possible that over the course of the study, the red pandas became more comfortable with their yard and began to use it more.

In order to determine whether environmental factors play a significant role in the red pandas percentage of time observed outdoors, a longer and more in-depth study could be conducted.

Zoos currently housing red pandas, or looking to bring red pandas into their collection, may find useful insights from this study's measurement of management changes and their impact on red panda behavior. 

Acknowledgements

I would like to thank my internship mentor, Marty Dearie for supervising my project and brainstorming management changes with me. I would also like to thank Shellie Pick for her review and edits of this paper. Thank you also to the Asia Trail team who reviewed and implemented the appropriate weekly management changes to the red panda exhibit, and to Michael Brown-Palsgrove, the Asia Trail Curator. Lastly, thank you to the NZP digital animal behavior lab and the Smithsonian Women's Committee for their support of the study through equipment loans.

Photo Credit:

Smithsonian National Zoological Park

Citations

Pradhan, S., Saha, G.K. and Khan, J.A. 2001. Ecology of the Red Panda (*Ailurus fulgens*) in the Singhalila National Park, Darjeeling, India. *Biological Conservation* 98:11-18.

African Penguins: The cold truth

Katy Massey, Corporate Conservation Coordinator
Virginia Safari Park
Natural Bridge, Virginia

We have lost 99% of the world's African Penguin (*Spheniscus demersus*) population since 1920, an estimated decline of 90 birds per week. African Penguins may become extinct in the next 15 years. In 2010, the IUCN added African Penguin to the Endangered Species List and, if the current rate continues as estimated, they will be extinct in the wild by 2030. A variety of threats over time have slowly eroded the once stable penguin population.

The first negative impact on the penguin population began with egg collectors. The green-tinged, fish smelling eggs were considered a delicacy up until the 1960's; over 13 million eggs were removed from the wild (Cott, 1953). The second problem facing penguins was guano collectors. Guano is a nutrient-rich

African Penguin Rescued Tangled in Fishing Line.
Photo courtesy of Dyers Island Conservation Trust.



bird dropping, sought after for its use in fertilizer. Guano layers were 13-20 feet thick and penguins burrowed into the guano layer to form nests. The burrowed nests kept them insulated from heat and cold and protected from predators. The breeding islands are now barren rocks and the penguins have to nest in shallow pits, exposed to the sun, predators, and occasional flooding.

Current day African Penguin population concerns are oil spills, finding food, and pollution. Oil is bad news for penguins, a spot of oil as small as the size of your thumb can cause harm. When you cut a hole in a wetsuit, water seeps in. The same thing happens to the African Penguin; they lose their waterproofing, become waterlogged and can drown. If they make it to shore, they try to preen the oil off, ingesting oil, and become ill (Barham, Underhill, Crawford, and Leshoro, 2007). Finding food has become increasingly difficult due to over-fishing of sardines and anchovies, forcing penguins to travel greater distances for food. This exerts more energy and exposes the birds to more predators (Sherley, Underhill, Barham, Barham, Coetzee, Crawford, Dyer, Leshoro, and Upfold, 2013). Pollution has been on the rise with an estimated 14 billion pounds of trash dumped into the ocean each year. Trash can float thousands of miles and contaminate pristine areas. The most

destructive item found among the debris is monofilament fishing line. Penguins and other wildlife become heavily entangled with the line wrapping around the body, flippers, and feet preventing the bird from swimming or diving. Animals become exhausted and if not rescued, will drown. (Ryan, 2015)

Saving the African Penguin is an aggressive global team effort. Participation is needed from scientists, zoologists and everyday citizens. In the United States, the ZAA's (Zoological Association of America) has developed an Animal Management Program (AMP) to save this amazing species. One of these team members is located in the foothills of the blue ridge mountains at the Virginia Safari Park. Bird enthusiast and park owner, Eric Mogensen learned about the plight of African Penguins and joined the efforts to save them. In the summer of 2016, the new Virginia Safari Park penguin colony made their public debut. The large naturalistic exhibit, equipped with a swimming pool, allows the penguins to feel right at home. In February, 2018 hard work paid off when 'Winter,' the first African Penguin chick, hatched at the Virginia Safari Park. General Curator Sarah Friedel oversees the Virginia Safari Park's Penguin Program and says, "The most commonly asked question is about the lack of ice in



Before and After Beach Population Comparison.
Photo courtesy of Dyers Island Conservation Trust



Keeper Caring for New Colony. Photo courtesy of Virginia Safari Park

Installing Artificial Nests. Photo courtesy of Dyers Island Conservation Trust



New Penguin Chick. Photo courtesy of Virginia Safari Park

the exhibit." Most people are surprised to learn that only a few species of penguin live as far south as Antarctica. The penguins seem to be enjoying the Virginia weather and three more penguin chicks have successfully hatched this fall. Animal ambassadors like these help zoos play an important role in instilling a passion for wildlife in future generations who see these aquatic acrobats firsthand.

Not only do these penguins raise awareness, but they also help raise funds to support programs in the wild through the Dyer Island Conservation Trust (DICT), located on the southern tip of Africa. This is a critically important ecosystem; home to breeding colonies for a wide range of seabirds, Cape fur seals, Great White Sharks, various dolphin and whale species. The DICT built a world-class rehab facility called the African Penguin and Seabird Sanctuary (APSS.) This facility is able to care for displaced birds and release them back into the wild. The ZAA's African Penguin Management Program supports DICT efforts organizing beach clean-up days, installing over 2,000 artificial nests, supplying fishing line recycle bins, and providing environmental education.

It is a common misconception that you have to have millions of dollars to make a difference in conservation. The reality is, every little bit helps. For example, it only takes \$36 to sponsor a penguin nest (*image left*). Other ways to help are organizing a local beach clean-up day, recycling and raising awareness.

The Virginia Safari Park, Metro Richmond Zoo, Tanganyika Wildlife Park, LEO ZCC,

Hemker Park & Zoo, Wildlife World Zoo and Wildwood Wildlife Park work together to develop sustainable captive penguin populations as an insurance policy for the rapidly declining penguin populations of the wild. Supporting zoos involved with wild programs such as DICT, provide guests an educational opportunity and contribute to long-term conservation. "The greatest threat to our planet is the belief that someone else will save it" -Robert Swan. Every individual makes a difference, together we can change the world. The Dyer Island Conservation Trust (DICT) has built a world-class seabird sanctuary in Gansbaai, the African Penguin and Seabird Sanctuary (APSS). The sanctuary serves as a custom-designed, marine bird rehabilitation centre in the Overstrand area, which provides temporary rehabilitative care to diseased, displaced, injured, oiled and abandoned marine birds with special focus on the endangered African Penguin. Marine bird rescue, rehabilitation and release form part of the conservation management plan to conserve and maintain African Penguin populations, and other seabirds. Through continued research, education and awareness programmes, the aim is to mitigate human impacts on the colonies.

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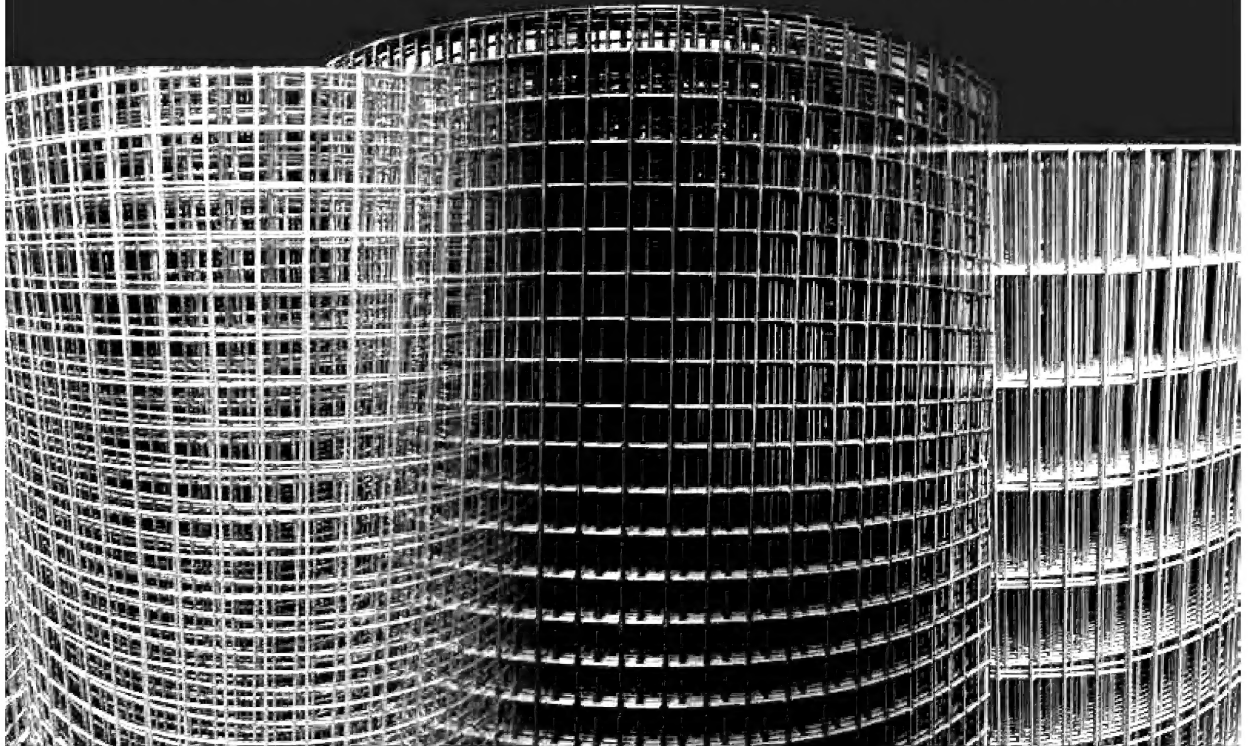
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